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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/591,506	06/26/2007	Takashi Sawaguchi	0003187USU	2329

27623 7590 02/25/2010

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EXAMINER	
REDDY, KARUNA P	
ART UNIT	**PAPER NUMBER**
1796	
MAIL DATE	**DELIVERY MODE**
02/25/2010	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/591,506	SAWAGUCHI ET AL.	
	Examiner	Art Unit	
	KARUNA P. REDDY	1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 November 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This office action is in response to amendment filed 11/13/2009. Claims 1 and 3 are amended; claims 4-8 are added. Accordingly, claims 1-8 are currently pending in the application.

   This action is made final in light of claims that are newly presented following the preceding office action.

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim Rejections - 35 USC § 102

3. Claims 1-2 are rejected under 35 U.S.C. 102(b) as being anticipated by Pope et al (J. Mater. Res., Vol. 4, Pages 1018-1026).

   The rejection is adequately set forth in paragraph 5 of office action mailed 8/10/2009 and incorporated here by reference.

4. Claim 4 is rejected under 35 U.S.C. 102(b) as being anticipated by Pope et al (J. Mater. Res., Vol. 4, Pages 1018-1026) as evidenced by Ichikawa et al (US 6,146,801).

   The discussion with respect to Pope et al in paragraph 5 of office action mailed 8/10/2009 is incorporated here by reference. Furthermore, Pope et al employed in one experiment a coupling agent, such as methacryloxypropyltrimethoxysilane, to improve the chemical bonding between silica gel and PMMA (page 1019, col. 2, lines 4-12).

Evidence that methacryloxypropyltrimethoxysilane is hydrophobic in nature comes from Ichikawa et al (col. 19, lines 45-48).

Therefore, Pope et al anticipate the instant claims

Claim Rejections - 35 USC § 103

5. Claims 3 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pope et al (J. Mater. Res., Vol. 4, Pages 1018-1026) in view of Zerda et al (Macromolecules 2003, 36, 1603-1608) and Ichikawa et al (US 6,146,801).

The discussion with respect to Pope et al in paragraph 5 of office action mailed 8/10/2009 is incorporated here by reference. Furthermore, Pope et al employed in one experiment a coupling agent, such as methacryloxypropyltrimethoxysilane, to improve the chemical bonding between silica gel and PMMA (page 1019, col. 2, lines 4-12). Evidence that methacryloxypropyltrimethoxysilane is hydrophobic in nature comes from Ichikawa et al (col. 19, lines 45-48)

Pope et al is silent with respect to supercritical carbon dioxide fluid, and nano silica treated with hexamethyldisilazane.

However, Zerda et al teach that incorporation of nanometer scale silicates into a composite is problematic due to increase in viscosity. The viscosity of monomer-silicate mixture is such that the homogeneous dispersion is not possible and defect formation is common. The challenges of high viscosity are overcome by using supercritical CO_2 as a reaction medium. Homogeneous dispersion of monomer, initiation and subsequent polymerization all occur under a lower viscosity in this medium. Therefore, in light of the teachings in Zerda et al, it would have been obvious to one skilled in art at the time

invention was made to impregnate the MMA monomer into pores of nanosilica, of Pope et al, in the presence of supercritical CO_2, for above mentioned advantages.

With respect to nano silica treated with hexamethyldisilazane, Ichikawa et al teach hydrophobic inorganic fine powders such as silica (col. 18, lines 61-65). The useable hydrophobic treating agents include γ- methacryloxypropyltrimethoxysilane and hexamethyldisilazane (col. 19, lines 45-54). Case law holds that selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). Therefore, in light of the teachings in Ichikawa et al and case law, it would have been obvious to one skilled in art at the time invention was made to hydrophobize nano silica, of Pope et al in view of Zerda et al, with hexamethyldisilzane because Pope et al discloses in one embodiment treatment of the nano silica with hydrophobic agent such as γ-methacryloxypropyltrimethoxysilane, and Ichikawa et al has shown that γ-methacryloxypropyltrimethoxysilane and hexamethyldisilzane are interchangeable in their ability to function as hydrophobic treating agents in the treatment of fine silica powders and one skilled in art would expect such a hydrophobic treatment to work, motivated by expectation of success.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Pope et al (J. Mater. Res., Vol. 4, Pages 1018-1026) in view of Ichikawa et al (US 6,146,801).

The discussion with respect to Pope et al in paragraph 5 of office action mailed 8/10/2009 incorporated here by reference. Furthermore, Pope et al employed in one experiment a coupling agent, such as methacryloxypropyltrimethoxysilane, to improve

the chemical bonding between silica gel and PMMA (page 1019, col. 2, lines 4-12) which reads on hydrophobic treatment of nano silica.

Pope et al are silent with respect to nano silica treated with hexamethyldisilazane.

However, Ichikawa et al teach hydrophobic inorganic fine powders such as silica (col. 18, lines 61-65). The useable hydrophobic treating agents include γ-methacryloxypropyltrimethoxysilane and hexamethyldisilazane (col. 19, lines 45-54). Case law holds that selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 65 USPQ 297 (1945). Therefore, in light of the teachings in Ichikawa et al and case law, it would have been obvious to one skilled in art at the time invention was made to hydrophobize nano silica of Pope et al with hexamethyldisilzane because Pope et al discloses in one embodiment treatment of the nano silica with hydrophobic agent such as γ-methacryloxypropyltrimethoxysilane, and Ichikawa et al has shown that γ-methacryloxypropyltrimethoxysilane and hexamethyldisilzane are interchangeable in their ability to function as hydrophobic treating agents in the treatment of fine silica powders and one skilled in art would expect such a hydrophobic treatment to work, motivated by expectation of success.

Response to Arguments

7. The rejection under 35 U.S.C. 102(a) as set forth in paragraph 4 of office action mailed 8/10/2009 is withdrawn in view of filing of an English translation of the foreign priority document (Japanese Patent Application NO. 2004-64280).

8. Applicant's arguments filed 11/13/2009 have been fully considered but they are not persuasive. Specifically, applicant argues that (A) porous silica gels of Pope et al are synthesized by sol-gel method and are not in the form of particles. Pope clearly states "after mixing, solutions were allowed to gel and dry at 40^0C" (emphasis added by applicant). In contrast, nano silica of claim 1 is in the form of particles of average primary particle size of 40 nm; (B) Pope describes composites having a phase dimension on the order of 100 Å. Since, average pore diameter of silica gel is 156 Å, perhaps the meaning of phase dimension should be interpreted as the pore diameter; and (C) benefits of the method of present disclosure that arise from the network structure, such as high clarity, high heat-resistance, and high hardness cannot be predicted by Pope.

With respect to (A) and (C), firstly, it is noted that the features upon which applicant relies (i.e., nano silica is in the form of particles and particles have an average primary particle size of 40 nm; high clarity, high heat-resistance and high hardness) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Secondly, Pope et al teach that the gel is dried at 40^0C and that composite (i.e. silica gel-PMMA) has dimensions on the order of 100 Å. Hence, it is the examiner's position that silica gel of Pope et al meets the nano silica limitation of instant claims.

With respect to (B), contrary to applicant's argument, Pope et al refers to phase dimension of the composite, which composite is silica impregnated with PMMA. Hence, it is the examiner's position that phase dimension in Pope et al refers to the composite

(which reads on nano silica of instant claims) and not pore diameter as alleged by the applicant.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KARUNA P. REDDY whose telephone number is (571)272-6566. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vasu Jagannathan can be reached on (571) 272-1119. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. P. R./
Examiner, Art Unit 1796

/Vasu Jagannathan/
Supervisory Patent Examiner, Art Unit 1796